Gathering: a survival activity in arid zones of Mali

Recent droughts in Saharan and Sahelian regions have further aggravated the shortage of grain, an essential subsistence foodstuff for the regional populations. Consequently, humans and livestock increasingly exploit certain wild plants whose production is being exhausted in many areas. Studies are under way in northern Mali on the critical limits of this natural resource and conditions of its use.

There is very little land available in these regions due to insufficient and unevenly distributed rainfall, and wayward flooding of the Niger River. Since the last drought periods (1970s-1980s), people have turned to gathered foods and purchased imported grain to compensate for the chronic food shortage.

Many observers consider wild plant gathering to be a complementary means for people to obtain various products (fruit, sap, leaves, bark, etc.) of special interest, e.g. human and livestock foods, craft activities and traditional medicines. In Saharan and Sahelian regions, these products are often not taken into consideration in national production, trade and consumption surveys, since they are gathered in the wild.

In northern Mali, the importance of gathered foods as tide-over products varies according to the social group — Maure, Fulani, Songhay-Arma, Tuareg, Bellah — and the farming system — agriculture, livestock farming and fishing. The results presented in this paper were obtained in field surveys, mainly conducted in the department (or circle) of Bourem (Figure 1).

A. DIARRA, PhD
(Rural Geography)
Rés. le Barcelone Bât. 6,
145 rue Guillaume Janvier,
34070 Montpellier,
France

Gathered foods

Gathering activities include some aquatic species (e.g. burgu grass and water lily), but far more land species (woody plants and grasses), and wild fonio and karengiya are favorites of all of nomadic and settled peoples in these regions (Table 1).

Burgu grass

Burgu grass *(Echinochloa stagnina)* is a semi-aquatic perennial plant that is well adapted to marshy environments. It is used in preparing local traditional dishes and provides excellent fodder for livestock (cattle, horses, goats and sheep). Large colonies of this grass grow in temporary flood zones with Sahelian-type climates. In Mali, it is chiefly found in the inner Niger delta zone and around the Niger River loop. It is much more sparsely distributed in areas with poor moisture conditions. It grows on rapidly-degrading acidic soils in three different types of environment:

– in deep basins that are regularly inundated, as a result of river flooding, for 6-7 months to depths reaching 2.8 m;

– in flood plains where flooding can last 4-5 months, reaching depths of 1.5 m;

– in the main flood plains of the Niger River and tributaries, where regular flooding lasts 3 months, reaching depths of 0.6-1.5 m, with the floods rising in September and falling from December-January.

The food value of burgu grass depends on its vegetative stage. According to FRANCOIS *et al.* (1989), the overall food value of the herbaceous biomass in flood plain rangelands is sufficient for feeding livestock, i.e. net energy increases from 0.53 fodder units/kg dry matter in August, at the onset of flooding, to 0.69 in March when livestock are grazing. There are considerable variations in digestible nitrogen fractions between

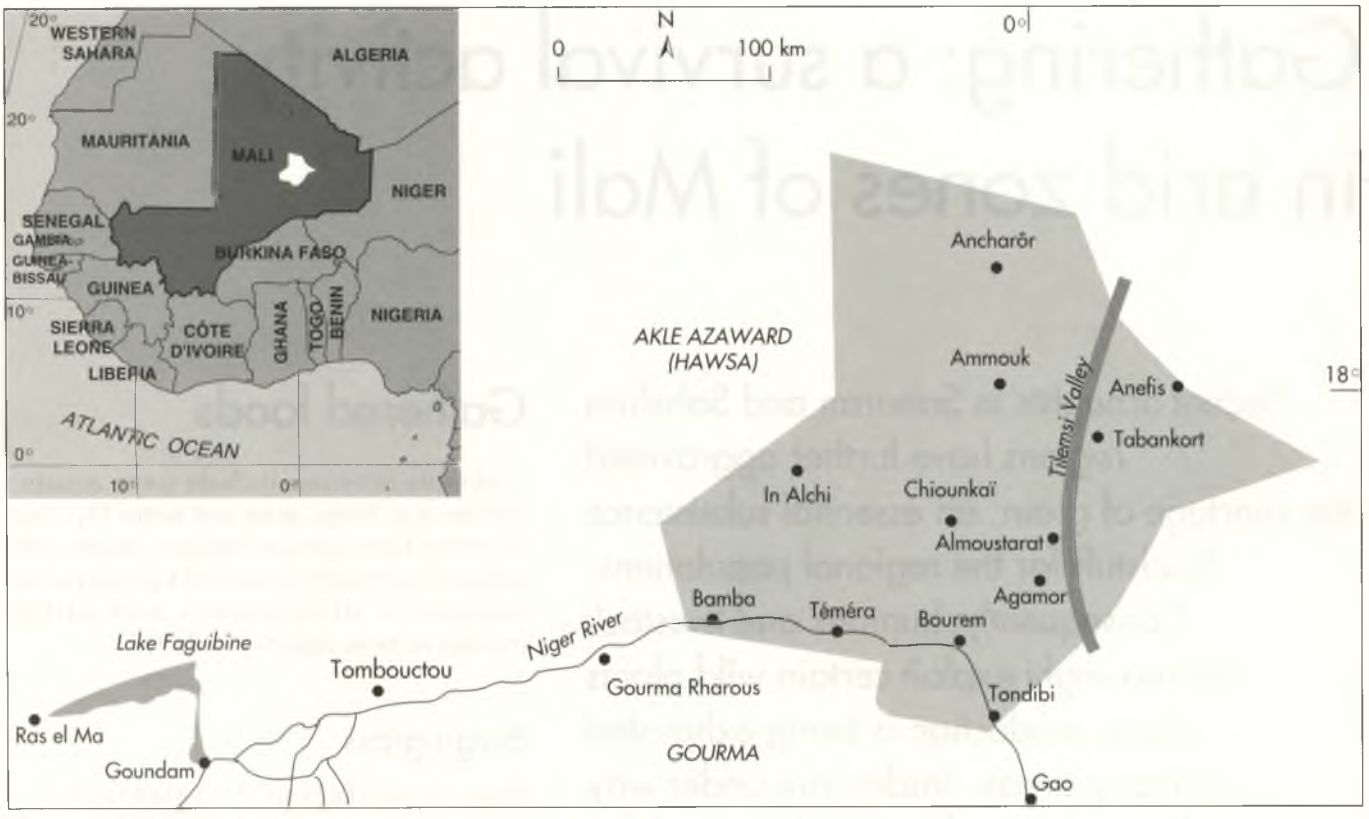

Figure 1. The northern Mali region.

seasons. Mineral contents, apart from phosphorus and sodium, are higher when floods are falling than when they are rising.

In the past, burgu grass was only used as livestock feed, but people now use it as a nutritional supplement food, especially during periods of shortage (April-June). The "hori" (grain) is thus harvested at the end of the vegetative cycle. It is a relatively important cereal in the diets of Songhay-Arma villagers (MAIGA, 1988). Hori, like rice, is consumed as a paste. Moreover, burgu stems are cut, singed slightly, rolled into bunches, dried and stored. These dried bunches are then threshed and pounded; the fine product is moistened in straw strainers before processing into kundu (cool sweet drink), katu (gelled brown cream) or manchi (syrup).

Water lily

Water lily *(Nymphaea lotus),* an aquatic plant that grows in rivers and large temporary marshes, is regularly eaten as a tide-over food. The seeds (hanku) are gathered before the rice crops have ripened, and as much as possible afterwards. Water lily rhizomes (dundu) are edible and highly rated. In the Niger River valley, water lilies grow in separate fields or between fields. In the latter situation, there are mutual exploitation agreements between people and boundaries are set between family holdings. Anyone can gather lilies growing in areas that have not been allotted to a specific family. Water lilies growing in ponds in the Gourma region are gathered by the Bellah (former Tuareg slaves) until February. Gathering is carried out when

Steppe-like vegetation in Gourma region.
Photo A. Diarra

floodwaters have receded: January-March in the river valley and November-January in Gourma ponds.

Water lilies even grow under minimal flooding conditions, in contrast to rice which requires large quantities of water. A drop in rice yields can thus coincide with good water lily capsule harvests. However, such harvests can actually only fulfil 3-month consumption needs due to the increased exploitation of this resource.

Table 1. Use of the main gathered products.

Plant	Gathering season	Food coverage	Potential relative to needs	Constraints	Ethnic group involved
Water lily	October to December	3 months	insufficient	manpower	Songhay-Arma
Water lily	October to February	6 months	insufficient	small boat needed	Bellah
Boscia sp.	April-May	2 months	available	preparation time	Peul, Tuareg, Bellah, Songhay-Arma
Karengiya	September to January	5 months	available	gathering time disappearance of ponds closeby	Bellah, Tuareg
Fonio	mid-August to April	2-8 months	available	gathering time	Peul, Bellah Tuareg, Songhay-Arma

Woody plants

Leaves and fruit, etc., of woody plants, particularly *Maerua crassifolia, Boscia senegalensis* and *Balanites aegyptiaca,* are widely consumed.

Maerua crassifolia

Leaves of this species are cooked for a long time and eaten with salt in food shortage periods. They can also be reduced to a salty paste and blended with butter. Tuaregs call it "the genie tree".

Boscia senegalensis

The yellowish ripe fruit of this tree is generally gathered at the beginning of the rainy season. The whitish sweet fruit pulp can be cooked for a long time to produce a very sweet concentrate. This extract can then be mixed with other foods: millet butter, millet and rice porridges, sour milk, leaves, etc. The fruit pits are also gathered before the fruit is ripe (June-July). The kernels are extracted through several operations, including burning, crushing, drying, threshing and winnowing. Dried pits can be kept for about 6 months. They are then swelled in water, cooked for a long time and consumed with fresh milk.

Balanites aegyptiaca

Wild date fruit has a reddish unsweet pulp. The fruit is either sucked in raw form or macerated in water to produce a refreshing drink. Kernels extracted from the pits are also cooked for a long time and eaten. In addition, the flowers are consumed raw.

Grasses

Wild fonio *(Panicum laetum)* and karengiya *(Cenchrus biflorus)* are two of the most commonly gathered grasses because of their high seed yields.

Wild fonio

Wild fonio is an excellent fodder plant (fresh or dried) for all types of livestock. The grain is also consumed by humans. It grows densely in poor soils (especially clay, loam and sandy loam) of wadis, basins and dried ponds. However, it does not grow in sand, thus explaining the decline of fonio fields subsequent to the appearance of sand banks in the Gourma region, 20-30 km north of the Gossi-Gao road.

Fonio grain is harvested in two steps. The aerial step (mid-August), at the beginning of ripening. The grain is gathered in long-handled baskets, generally made from *Acacia senegal* roots. The basket is brushed, from front to back, along the grass just under

History and geography of northern Mali

In the Hawsa region north of the Niger River, where there is less than 150 mm/annum of precipitation, the plant cover grows on sandy soils or is concentrated around wadis. Herbaceous vegetation also grows in basins in the dead valley of Tilemsi.

The Gourma region south of the river, with 250-500 mm/annum of precipitation, is a large plain scattered with ponds and indented with wadis. There is a steppe-like vegetation cover.

In the Niger River valley (150-250 mm/annum of precipitation), floating rice and sorghum are cropped on the floodplain, close to burgu grass cover, after the floods recede. The relatively uncultivated highlands are rarely flooded. The floodplain (high-water bed) of the 626 km Tombouctou-Labezanga reach (or river section) is estimated to cover a 165 000 ha area, while non-floodplain terraces suitable for development are estimated at 86 500 ha — but only 24 070 ha are currently used (DIARRA, 1993).

The Niger River valley has been exploited continuously since the great empires of the Middle Ages (9th-16th century). Overuse of these resources and trade relations between different social groups during the production process prompted the colonial administration to draw up land-use agreements to control disputes.

There was a cereal crisis in the 1950s despite the adequate precipitation levels. The agricultural situation (mainly rice cultivation) was affected by many hazard factors: irregular rainfall and flooding, bursting earth dams and pest attacks (e.g. rhizophagous fish, seed-eating birds, parasitic worms). There was a permanent food shortage and high quantities of grain were imported from areas with higher precipitation. According to LEROUX (1953), farmers themselves imported grain after trips to the south and southwest of the country to sell their labour or barter livestock for cereals. Gathered foods were widely used, with most of the population living off them. However, since the droughts of the 1970s and 1980s, these wild plant harvests have not been sufficient to meet peoples' needs.

Grain production in Bourem circle was estimated at 4 669 t in 1991, according to surveys of nomadic and settled populations (DIARRA, 1993). These figures are quite close to those provided by the Direction régionale de la statistique in Gao for the 1988-1989 (4 649 t) and 1989-90 (5 027 t) crop seasons. Themean area exploited on this 180 km canal reach is 3 500-4 000 ha, with mean yields of 1.5 t/ha for floating rice, 3-4 t/ha for irrigated rice and 0.5 t/ha for sorghum.

During the same period (1990-1991 season), cereal needs were estimated at 16 038 t for a population of 71 469 (according to 1987 national census figures). Needs were as high as 18 558 t for 1968 to 1987 for a mean 92 794 population. High outmigration occurred between these two periods because of serious drought in Bourem circle. The mainly nomadic populations migrated in different directions, mainly towards Gao circle (FOURNIER, 1987).

Balanites aegyptiaca.
Photo A. Diarra

the heads; grain is thus shaken from the heads into the basket. Only small quantities are gathered, but these seeds are considered to taste better than those collected on the ground. This latter harvest takes place in September when the grass is fully ripe and the grain falls on the ground.

The stalks are cut at ground level with a machete to clear a sufficient area for gathering. The women then sweep up the fallen grain on the ground. It is winnowed several times to get rid of impurities. The clean grain is then kept in large sacks or stored in underground silos; yields are higher than obtained for the aerial harvest. It is thus possible for one person to gather 100 kg/month.

DAVIES & THIAM (1987) estimated that gathering lasts 15 days to 2 months in a poor year, 2-4 months in an average year and 4-8 months in a good year. When harvesting begins in early October, there should be enough grain to feed people until the following June. In 1973 (severe drought year), the rainy season was early and short, and the wild fonio was gathered throughout the year. However, in 1990, floodwaters destroyed all of the grass.

Karengiya

Karengiya is an annual fodder plant that grows widely in arid zones on poor soil. It flourishes in Gourma region, but has almost disappeared from the Hawsa region of Bourem circle. There are stands of karengiya in a few basins of Tilemsi valley.

Karengiya is consumed by all animal species of Saharan and Sahelian regions. To obtain a high quality fodder, the plant is cut green, thus avoiding the spines that develop at ripeness. The grain is gathered after the plants have dried up and lost their spines. This grain is a staple food of nomadic Tuaregs and some Songhay-Arma groups.

Karengiya is considered to be one of the most nutritional cereals of the Saharan-Sahelian zone. It is in high demand, despite low yields and harvesting constraints. Harvesting begins by sweeping up the grain on large sandy areas; the swept grain is then transferred to hard flat areas. The first threshing is performed with a wooden tamper ("jivinji" in the Tamacheq language) and the second with an abbillan (wooden flail) attached to a bowed piece of wood. This is followed by many winnowing sessions, interspersed with short threshings; the clean grain is stored in sacks.

These activities are generally carried out by Bellahs. The women do the sweeping, carrying and winnowing, while the men thresh the grain and put it into sacks. These operations begin in late August or early September and can occupy Bellah gatherers until January (5 months). Yields can be as high as 30-40 kg/month/gatherer.

Access to gathered products

Saharan-Sahelian societies traditionally live on a subsistence economy (subsistence farming and trade between nomads and settled people). Everyone has access to gathered foods. Even highly-rated wild fonio is accessible to anyone with the physical means of harvesting this resource (i.e. workmen and draught animals). Only priority rights are recognized by customary users in some areas. In Tilemsi, this easy access to wild plant resources could be explained by:
– the low population density;
– the wide distribution of fonio;
– the high pre-drought economic status of many people (especially Maure merchants);
– the progressive emancipation of slave labourers (Bellah).

Access to wild fonio fields

The Songhay-Arma, Tuareg, Bellah and Fulani chiefly gather wild fonio in the dead valley of Tilemsi, Gourma region and along the Niger River banks.

In the past, some nomadic groups controlled all of the large fonio-growing areas of Gourma, as reported by DAVIES & THIAM (1987). This control was accepted by neighbouring groups which, in turn, controlled other plains. At the outset of the 20th century, several groups of ex-slaves (especially Bellah) moved into the Gourma region, taking advantage of its prime geographical location and high forage potential. The forage resources of this region were also tapped by herders escaping vegetation shortages in other regions of the Niger River loop. The fonio plains of Gourma were generally controlled by chiefs of native groups (free Tuaregs and Bellahs).

There were a number of families living in these zones to guard the fields. These land management preventive measures deterred

people of other regions from gathering grain before the heads were ripe. This long-standing traditional code was still respected during the French colonization period. The chieftainries (tribes, cantons) had enough power to protect and manage their lands. The rich noble classes of Tuaregs, Fulanis, Maure-Kountas and Songhay-Armas were not involved in these "degrading" wild plant gathering activities. However, these activities were not scorned by Ineslimen (men of God), for whom these edible wild plants were considered to be Allah's gifts to feed men and livestock. In 1960, the year of Malian independence, new land arrangements were drawn up, i.e. all of the land in the territory became government property. This reduced traditional local powers, leading to uncontrolled abusive exploitation of natural resources.

Burgu rangelands, essential for herding

Burgu grass is the main aquatic grazing plant of the Niger River valley and a complementary human food source. It has always had an important role in maintaining herding activities, especially during periods of rapid herd expansion (e.g. during the 1950s and 1960s). It is contended by settled communities and nomadic herdsmen: the dates when the herds can graze, set by the different villages according to their cropping schedules, is often a source of discord between farmers and herders.

The ways burgu rangelands function and are used highlight the regional economic, agronomic and environmental balances and imbalances. The rangeland dynamics depend on:

– climatic factors (floods, precipitation), which determine production levels;

– intensities of grazing and gathering for the purpose of selling the products on local markets;

– burgu grass and rice selling prices, which can, during periods of high demand, lead to transformation of some rice fields into burgu rangelands (e.g. at Bamba in 1990);

– need for tide-over foods during food-shortage periods.

Note that there have been recent plans to integrate burgu grass in crop rotation schemes. In contrast to rice, burgu grass favours mulching of organic matter and

Social groups in northern Mali

The Songhay-Arma (the largest group by far) and Tuareg (or Kel Tamacheq) have almost identical hierarchical social structures (Table 2). Many Fulanis in this zone have been assimilated into the Songhay-Arma group. The Maure social hierarchy is quite similar to that of the Tuaregs. The Bellah are traditionally considered as Tuareg servants (now officially emancipated).

The nomads (Maure, Tuareg and Fulani), mainly herdsmen, live in arid zones around the Niger River, utilizing the grazinglands from January to March.

The settled groups (Songhay-Arma, Fulani and Tuareg landowners, and free Bellahs) generally live in the Niger River valley. They grow rice, sorghum and market garden crops, but yields are usually not high enough to meet their subsistence needs.

Table 2. Songhay-Arma and Tuareg social organization.

Social structure	Tuareg	Songhay-Arma
Aristocrats (warriors)	Imajeghen	Borcin
Clergy	Ineslimen	Borcin alfaga
Vassals	Imghad	Gabibi-Sorko
Craftsmen	Inaden	Garassa
Slaves	Iklan (or Bellah)	Bannya

Eucalyptus planted by villagers along the Niger River.
Photo A. Diarra

Table 3. Assessment of yields for crops and gathered foods (wild fonio, karengiya and wild fruits) in 1988-1989 (TOGOLA, unpublished results).

District	Submersion rice crops	Receding flood and pond crops	Irrigated crops	Gathered plants
Central Bourem	+++	0	+	++
Almoustarat*	-	+	-	+++
Bamba	+++	-	-	++
Téméra	++	-	-	+++

*: dead valley of Tilemsi.
+++: important; ++: secondary; +: stopgap;
0: very low; -: non existent.

Table 4. Estimate of time allotted to cropping and gathering activities (TOGOLA, 1988).

Period	Almoustarat 1985-1986	Bamba 1985-1986	Central Bourem 1987-1988	Téméra 1987-1988
October-January	++	+++	+++	+++
February-May	+++	0	0	+
June-September	0	+++	+++	+++
Overall for the year	++	+++	+++	+++

+++: important; ++: average; +: low; 0: very low.

hinders soil salification. Along the same lines, the marked change in land allocation, including recent transformation of burgu rangelands into rice fields (since the latest droughts), is now a critical focus of the land question in the Niger River valley.

The economics of gathering

Food gathering, which is spatially and temporally limited, has always been an important way for Saharan/Sahelian people to exploit regional natural resources. In the Middle Ages, the inhabitants of Tadmekka (medieval Berber town in northeastern Mali) already fed themselves with "meat, milk and a type of wild grain", i.e. fonio (EL-BEKRI, 1913). In the first half of the 20th century, even though population densities were low, all social groups consumed substantial quantities of gathered foods.

The last two decades of drought, preceded by a period of anarchic and abusive natural resource exploitation, prompted people to gather wild plants in areas that were also used for livestock grazing. In Gourma region, close to 90% of the population gathers wild plants almost year-round. In Bourem circle, 61% of the settled people and 70% of the nomads have declared that they are gatherers.

Gathering and agriculture

The Système d'alerte précoce (SAP) aims at investigating the causes of famine and food insecurity in Mali. For instance, TOGOLA's survey in Bourem circle (unpublished results) revealed that controlled submersion cropping and irrigated cropping are supplanting gathering (Table 3). Gathering is an important activity in Almoustarat and Téméra districts, but only secondary in Bamba and central Bourem districts.

Agricultural activities and wild plant gathering are carried out by people living near the Niger River (Bamba, Téméra and Bourem districts) for 7-9 months a year, from June to January (Table 4). This is closely dependent on climatic conditions and yields. In Almoustarat district, these activities are conducted from October to May. However, in 1987-1988, some people of Téméra district only cropped and gathered from February to May.

Production levels of most wild plants are more dependent on the regularity of the rainfall distribution than on mean annual water quantities. This correlation also applies for fonio ripening, which occurs from mid-August to mid-September. Sixty percent of a family's cereal needs can thus be met in high fonio production years. Conversely, in some zones, high precipitation in late August or September can destroy all of the fonio grass, just at the point when the grain is scattered on the ground ready for collection.

Prices of gathered foods

Market prices for gathered products such as water lily, *B. senegalensis* and karengiya that increased in crisis periods have not dropped since 1985 due to continued high demand. The trading value of wild fonio has varied substantially; it is also the most widely bartered gathered product (Table 5). According to TOGOLA (unpublished results), a wooden cup is used (An Nafaga Wa Na Alhaq — "the reality measurement" in the Tamacheq language), for a standard measure of about 3.5 kg of grain. The bartering conversions are as follows:

– 1 adult goat = 15-25 cups of coarse fonio grain or 15-20 cups of karengiya grain;

– 1 sheep = 15-30 cups of fonio grain or 20-27 cups of karengiya grain.

Table 5. Money and bartering value of fonio grain before devaluation of the CFA franc (DAVIES & THIAM, 1987).

Quantity of fonio (kg)	Value	Bartered product
100	5 000 to 6 000 CFA	one less than 1 year old goat
300	15 000 to 18 000 CFA	one 2 year old heifer

Table 6. Kilogramme price variations for wild fonio and millet in Gossi district, in CFA francs before devaluation (DAVIES & THIAM, 1987).

	1970	1974	1984	1987
Fonio	20	25	60	50
Millet	40	40	90	90

Millet: official prices set by the Office des produits agricoles (Mali).

Fonio is cheaper in Gourma region, where it is widespread, than in Gao region. Traditionally, there are no set laws to control this market, i.e. no price/quality scales or special places where it is traded. Deals are made through discussions between parties. Prompted by recent droughts, a kind of wild cereal market is now being organized. Fonio is therefore regularly marketed in urban centres (TOGOLA, unpublished results). Nomadic merchants buy this wild product because of their cultural attachment to it, and city dwellers because it is more affordable than cereals imported from the southern part of the country.

Fonio has always been cheaper than millet, often half the price (Table 6). Moreover, the price of millet is fixed by the state and difficult to find beyond the production zones. The price of fonio, on the other hand, often varies according to climatic conditions and needs during food shortage periods. Hence, fonio prices skyrocketed during the 1984 drought year.

Attempts to domesticate wild species

There have been very few attempts to domesticate wild grain species. As an anecdotal example, in 1989, Kel Takarangat Kaolet Tuaregs sowed karengiya around their camp at Moudet, but the results are unknown.

In Mali, large-scale sowing experiments have only been undertaken with burgu grass; the first burgu rangeland regeneration trials began in 1980, coordinated by the Office de développement de l'élevage in the Mopti region (ODEM). There are now other similar projects under way along the Niger River from Mopti to Gao. These projects are supported or run by ODEM, the United Nations Sahel Organization (UNSO), a Norwegian church aid group, the Cellule d'appui au développement de l'élevage (CADE), Vétérinaires sans frontières (VSF) and the Commission of the European Communities (CEC).

Conclusion: monitoring current changes

Quantitative estimates of gathering activities are still quite rough. This could have a cultural explanation, as gathering was until quite recently done solely by the slave classes. The Malian Centre national de recherche scientifique et technique and the University of Oslo are currently working together as part of a bilateral Environment and Development Programme for Mali. The use of wild plants for dietary, health and craft purposes is being investigated in this Programme. An interdisciplinary Malian/Norwegian team is focusing on grain production assessments, energizing values and physical/chemical analyses of gathered foods. The team is also studying behavioural changes that occur in social groups when adapting to environmental constraints. It is now crucial to understand the survival strategies of people faced with chronic food insecurity in order to enable wider ranging interventions (regional or national).

Lowland burgu rangeland, late October.
Photo A. Diarra

Bibliography

DAVIES S., THIAM A., 1987. Les aliments de soudure : potentiels, contraintes et accessibilité (étude de cas du fonio sauvage dans le Gourma central). Rapport n° 4. Projet Information alimentaire, Save The Children Fund-Food Emergencies Research Unit (FERU), London School of Hygiene and Tropical Medecine, Mopti, Mali, not paginated.

DIARRA A., 1993. Utilisation des ressources naturelles et occupation de l'espace par les agriculteurs et les pasteurs en zone aride au Mali. PhD thesis, université Paul Valéry, Montpellier, France, 333 p.

EL-BEKRI A.-O., 1913. Description de l'Afrique septentrionale. Alger, Algeria, Adolphe Jourdan (ed.), 408 p.

FOURNIER I., 1987. Permanence de la sécheresse dans la région de Gao et évolution de la société tamacheq, 1969-1984. Etudes sahéliennes, Cahiers Géographiques de Rouen 28 : 31-38.

FRANCOIS J., RIVAS A., COMPERE R., 1989. Le pâturage semi-aquatique à *Echinochloa Stagnina* (Retz) P. Beauv. Etude approfondie de la plante bourgou et des bourgoutières situées en zone lacustre du Mali. Bulletin de la Recherche Agronomique de la faculté de Gembloux (Belgium) 24 (2) : 145-189.

GAUDIO A., 1988. Le Mali. Paris, France, Karthala, 267 p.

Temporary pond in the Hawsa region in September.
Photo A. Diarra

LEROUX H., 1953. Le problème des droits fonciers dans la boucle du Niger (subdivision de Bourem). CHEAM, Paris, France, n° 2 177, 22 p. + annexes.

MAIGA A.-I., 1988. La composante pastorale et les aménagements hydro-agricoles en zone fluviale. Possibilités de diversification et intégration des activités. Direction régionale de l'élevage, Mopti, Mali.

TOGOLA M., 1988. Indicateurs du Sytème d'alerte précoce (SAP) en zone nomade au Mali. Ministère de l'administration territoriale, Bamako, Mali, 6 p.

Abstract... Resumen... Résumé

A. DIARRA — **Gathering: a survival activity in arid zones of Mali.**

The recent droughts in Saharan and Sahelian regions have further aggravated the chronic shortage of grains, an essential subsistence foodstuff for the population. Humans and livestock increasingly exploit certain wild plants and production is becoming exhausted in many areas. Studies are being carried out in northern Mali on the limits and modes of use of this natural resource. The importance of gathered foods as tide-over foods varies according to the social group (Maure, Peul, Songhay-Arma, Tuareg or Bellah) and the farming system (agriculture, animal husbandry or fishing). The aquatic plants exploited are *Echinochloa stagnina* and the waterlily *Nymphaea lotus*. The land crops gathered are from ligneous plants *(Maerua crassifolia, Boscia senegalensis* and *Balanites aegyptiaca)* and herbaceous species, among which wild fonio *(Panicum laetum)* and cram-cram *(Cenchrus biflorus)* are favourites of all nomadic and settled populations.

Keywords: gathering, processing, price, arid zone, Mali, *Balanites aegyptica, Boscia senegalensis, Cenchrus biflorus, Echinochloa stagnina, Maerua crassifolia, Nymphaea lotus, Panicum laetum.*

A. DIARRA — **La cosecha, una actividad de supervivencia en zona árida en Mali.**

En las regiones saharianas y sahelianas, las recientes sequías han ahondado aún más el déficit crónico de los cereales, alimentos básicos indispensables para la supervivencia de las poblaciones. Los hombres y los rebaños explotan cada vez más algunas plantas silvestres, cuya producción se está agotando en numerosas zonas y se están realizando estudios en la región de Mali acerca de los limites y las formas de utilización de estos recursos naturales. La importancia de los productos de recolección como alimentos de empalme entre cosechas varia según los grupos sociales (Maure, Peul, Songhay-Arma, Tuareg, Bellah) y los sistemas de producción (agricultura, cria, pesca). Las plantas acuáticas explotadas son el "bourgou" *(Echinochloa stagnina)* y el nenúfar *(Nymphaea lotus)*. Los productos terrestres recolectados son plantos leñosas (*Maerua crassifolia, Boscia senegalensis* y *Balanites aegyptiaca*) y herbáceas, entre las que el fonio silvestre *(Panicum laetum)* y el cram-cram *(Cenchrus biflorus)* ocupan un lugar privilegiado para todas las poblaciones nómadas y sedentarias.

Palabras clave: cosecha, zona arida, producción, *Boscia senegalensis, Cenchrus biflorus, Echinochloa stagnina, Maerua crassifolia, Nymphaea lotus, Panicum laetum.*

A. DIARRA — **La cueillette : une activité de survie en zone aride au Mali.**

Dans les régions sahariennes et sahéliennes, les récentes sécheresses ont creusé davantage le déficit chronique en céréales, aliments de base indispensables à la survie des populations. Les hommes et les troupeaux exploitent de plus en plus certaines plantes sauvages, dont la production s'épuise dans de nombreuses zones. Des études sont menées dans la région nord du Mali sur les limites et les modalités d'utilisation de ces ressources naturelles. L'importance des produits de cueillette comme aliments de soudure varie selon les groupes sociaux (Maure, Peul, Songhay-Arma, Tuareg, Bellah) et les systèmes de production (agriculture, élevage, pêche). Les plantes aquatiques exploitées sont le bourgou *(Echinochloa stagnina)* et le nénuphar *(Nymphaea lotus)*. Les produits terrestres cueillis proviennent de plantes ligneuses *(Maerua crassifolia, Boscia senegalensis* et *Balanites aegyptiaca)* et herbacées, parmi lesquelles le fonio sauvage *(Panicum laetum)* et le cram-cram *(Cenchrus biflorus)* tiennent une place de choix pour l'ensemble des populations nomades et sédentaires.

Mots-clés : cueillette, transformation, prix, zone aride, Mali, *Balanites aegyptiaca, Boscia senegalensis, Cenchrus biflorus, Echinochloa stagnina, Maerua crassifolia, Nymphaea lotus, Panicum laetum.*